

## RESEARCH ARTICLE

### **Notification of the first sighting of sand steenbras *Lithognathus mormyrus* (Linnaeus, 1758) and modern species diversity of the family Sparidae at the Georgian and Crimean Black Sea coasts**

**Archil Guchmanidze<sup>1\*</sup>, Alexander Boltachev<sup>2</sup>**

<sup>1</sup> Fisheries and Black Sea Monitoring Center of National Environmental Agency. 11, Sherif Khimshiashvili ave., Apt. 5, 6010, Batumi, GEORGIA

<sup>2</sup> Institute of Marine Biological Research of RAS, 2, Nakhimov ave., Sevastopol 299011, Crimea, RUSSIAN FEDERATION

\* **Corresponding author:** guchmanidze@gmail.com

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#### **Abstract**

The results of ichthyological investigations on the species diversity of Sparidae family in the Black Sea coastal zone of Georgia and Crimean Peninsula in the last 15 years are presented. The first record of sand steenbras *Lithognathus mormyrus* (Linnaeus, 1758), new for Georgian waters and rare for the Black Sea, is described in details. The increase in species diversity of the Sparidae family representatives is discussed, as well as the increase in the number of records and abundance of salema *Sarpa salpa* and seabream *Sparus aurata* near Caucasus (Georgia) and Crimea. It is concluded that this process is connected with natural penetration of new and rare species to the Black Sea from the Mediterranean Sea ("mediterrization"), and in the last years it can be connected with intensive cultivation of the Mediterranean seabreams in marine farms in Turkey.

**Keywords:** First notification, mediterrization, species diversity, Georgia, Crimea

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#### **Introduction**

Penetration through the Istanbul Strait (Bosphorus) from the Mediterranean Basin is the most important vector of intrusion of new fish species for the Black Sea. This permanent process of "mediterrization" has been going on for about 7-8 thousand years, from the moment of the last joining of the New-Euxine lake to the World Ocean up to the present time (Zaitsev 2006). Some euribiont fish species form self-reproductive populations and enter the inventory of regular species of the Black Sea ichthyofauna, thus increasing its species diversity.

According to the last revisions, the Black Sea ichthyofauna consists of about 190 species and its diversity increases primarily due to the penetration of fish from Mediterranean Sea (Yankova *et al.* 2013, 2014; Boltachev and Karpova 2014a).

Naturalization of commercial fish species, having quite positive economic importance represents special interest. Due to this reason, finding of sand steenbras *Lithognathus mormyrus*, very rare for the Black Sea, with a short time interval near south-western coast of Crimea and near Turkey, as well as analysis in changing of species diversity of Sparidae family taking place in the last decades are of interest. For the last decade, two species of Sparidae family, salemia *Sarpa salpa* and seabream *Sparus aurata*, increased considerably their abundance, distributed along Georgian and Crimean coasts and went from the category “rare species” to the category “usual”.

On the other hand, in the last years in the coastal zone of Turkey, the aquaculture industry actively establishes marine farms, specialized on growing Black Sea and Mediterranean fish species, seabream in particular, which also can serve as a vector of introduction of new species for the Black Sea.

The purpose of the present work is to describe a new species for the Georgian ichthyofaunal, sand steenbras *L. mormyrus*, and to analyze in brief general tendencies in changes of species diversity and occurrence of representatives of Sparidae family in the Georgian and Crimean coastal zones in the last decades.

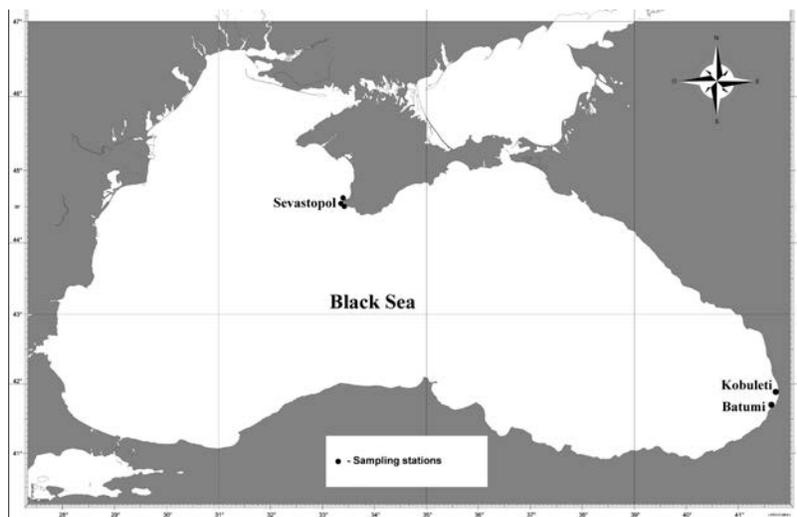
## Materials and Methods

On November 10, 2014, the Black Sea Conventional Inspection provided us a fish specimen caught using fishing rod in the Kobuleti aquatic area, 300 m from the shore at an approximate depth of 8 m (Figure 1). The surface temperature of the water was 17.3°C, salinity 16.6‰, on sandy-stony bottom. Another specimen was recorded on June 23, 2013 in the catch of the bottom trap in the coastal zone of the South-Western Crimea near Ay-ya Cape, 44°28.800'N, 33°37.400'E, at the depth of 40 m (Figure 1).

## Results

The collected specimens were identified as steenbras *Lithognathus mormyrus* (Linnaeus, 1758). For species identification the identification keys to marine fishes by Bauchot and Hureau (1986) and Fischer *et al.* (1987) were used. This species, up to the current study, had never been observed in the Georgian Black Sea coast, and hence this is the first record of *L. mormyrus* in the Georgian Black Sea coast. The total length was 196 mm, the standard length was 165 mm. Dorsal fin had 11 spines and 13 soft rays, the anal fin had 3 spiny rays and 11 soft rays; pectoral short, ending well before anus. There were 64 perforated

scales in lateral line. Body elongated, well compressed; upper profile of head slightly curved; snout elongated and triangular-shaped; posterior nostril an oblique slit, just in front of eye; eyes relatively small; scales on cheek and opercle. In the front part of the upper jaw there were ten conic teeth, with big side teeth (Figure 2). Back and sides were silver-grey, belly light, head most dark, brownish. There were 13 well-expressed vertical dark narrow stripes on the sides, on the tail stem there was one short and badly-recognized stripe. Belly and anal fins were yellowish, breast one light grey, those of back and tail darker brown.



**Figure 1.** Catch locations of *Lithognathus mormyrus* in the Georgian coastal zone and the south-western coast of the Crimean Peninsula

## Discussion

*L. mormyrus* reaches standard length of 55 cm, usually up to 25 cm (Vasil'eva 2007). The main diet consists of mollusks, sea worms and crustaceans. Protandric hermaphrodite, maturation takes place at the age of two years when length reaches about 14 cm, males dominate among small specimens, life duration up to 12 years (Vasil'eva 2007; Marine Species Identification Portal 2015). It is a near-bottom species, inhabits shelf to the depth of 50-150 m, and estuaries, mostly over sandy, silt-sandy bottom and among algae.

*L. mormyrus* is widespread and regularly encountered in the Mediterranean Sea, in the eastern Atlantic Ocean from the Bay of Biscay to the Cape of Good Hope, in the south-west portion of the Indian Ocean to the south of Mozambique, and in the Red Sea (Marine Species Identification Portal 2015). In the Black Sea, a specimen of this species was found on the Romanian coast (Stanciu and Ilie 1980), on the Bulgarian coast and the Gulf of Varna (Vasil'eva 2007).



**Figure 2.** *Lithognathus mormyrus* caught in the coastal zone of Georgia.  
(Photo A. Guchmanidze).

One specimen of *L. mormyrus* caught in the coastal zone of the south-western part of Crimea near Ay-ya Cape had the total length (TL) 219.8 mm, standard length (SL) 185 mm (to the end of the scale covering); body mass (W) 138.3 g, age, determined by the scale, 3 years. Meristic characters were D XI 12, A III 10, P 15, l.l. 62 (Figure 3).

During the study, in the coastal zone of the south-western Crimea, two more specimens of *L. mormyrus* were caught: on November 23, 2015 near Ay-ya Cape (TL 172.5 cm, SL 138.5 cm, W 65.4 g), and on April 13, 2016 in Kazachya Bay (TL 218.5 cm, SL 172.8 cm, W 102.6 g) (Figure 3). One more specimen was caught in Batumi Bay. It should be noted that *L. mormyrus* is not an object of mariculture and its penetration to the Black Sea is independent, which confirms the continuation of mediterrization of the Black Sea fauna.

According to the local fishermen, this type of fish was also found in other locations on the Georgian Black Sea coast. The areas around Gonio and the Green Cape (Mtsvane Kontskhi) were specifically indicated, although we have not confirmed this information.

It should be noted that all specimens caught in the Georgian and Crimean shores were mature individuals. It should be underlined as well that the data found in FishBase (2015) presenting wide distribution of this species in the Black and Azov Seas are not realistic. Singular findings have been registered in the Black Sea as given in the text of this paper. In the Sea of Azov it has not yet been recorded officially.



**Figure 3.** *Lithognathus mormyrus* caught near the Crimean peninsula south-western coast (Photo E.Karpova)

Finding of two specimens of this species, very rare in the Black Sea, near the Georgian and Crimean shores with quite small time interval made it possible to compare changes in diversity and occurrence of the Sparidae family representatives in these regions in the last years. The results of this analysis are based on the data of regular ichthyological observations in the Georgian sector, beginning from 2001 (A. Guchmanidze) and in the Crimean sector from 1996 (A. Boltachev), as well as on the published records. It should be noted that ichthyological studies in Georgia in the last two decades have been very limited.

Annular seabream *Diplodus annularis* (Linneus, 1758) is the most abundant and usual species in the coastal zone of Georgia and Crimea and along all the Black Sea shores (Svetovidov 1964). This species inhabits different biotopes and can be found in the coastal thickets of algae and sea grass, over hard (stones, rocks) and soft (sand, silty-sand) bottoms. Commercially it is caught as by-catch in small quantity. It is caught mostly by fishers, amateurs by line and by underwater hunters.

Sharpsnout seabream *Diplodus putazzo* (Cetti, 1784) is distributed near rocky shores of Crimea, Caucasus, Turkey, Bulgaria and Romania (Vasil'eva 2007). It is considered that this species is not very numerous everywhere. Near Georgian shore it is sometimes seen from the Turkish border to Kobuleti and Sukhumi and from Sukhumi to the border with Russian Federation. But the results of monitoring studies have shown that in the Crimean coastal zone this species is not rare in the biotopes of rocks and boulders, but during daytime it hides itself in the underwater caves, grottos, splits and other shelters (Boltachev and Karpova 2012). It is caught by underwater hunters near Crimea in small quantities. We have commonly seen that in the fish shops and markets of Trabzon and Istanbul sharpsnout seabream is sold and they are from the natural population caught by fishers and artificially grown in marine farms, located in the Turkish Black Sea coast.

Salema *Sarpa salpa* (Linneus, 1758) up to the second half of the 1990's was known by singular findings near the shores of Bulgaria, Romania, Turkey (Svetovidov 1964; Bilecenoglu *et al.* 2002). Near Georgia one specimen was

caught in 1930 in Batumi Bay (Svetovidov 1964), but since 2001 it is regularly sighted as single specimens or in small shoals, along Ajara and Abkhazia shores. For the first time salema was caught near Balaclava on the Crimean shore in September 1999, and since then it has reached quite high abundance in the south-western part of Crimea. In the last years this species was distributed along the southern coast of the peninsula and was recorded near the Cape Martyan and Ayu-dag (Boltachev and Yurakhno 2002; Boltachev and Karpova 2014a). Quite big shoals consisting of about 100 specimens were sighted. They have been caught as by-catch with stationary bottom nets in the bays of Sevastopol, with gill nets, as well as by underwater hunters. It can be found over sandy and stony bottoms.

Gilthead seabream, *Sparus aurata* Linneus, 1758, like salema, was a very rare species and singular specimens had been spotted near the shores of Bulgaria, Romania, Turkey. One specimen was caught near the Caucasian coast in Sukhumi Bay in the 1930's (Svetovidov 1964; Bilecenoglu *et al.* 2002). In the last decade according to the data of the first author, gilthead bream has become the second most common species among the representatives of Sparidae family after annular sea bream in the Georgian waters. It is caught by amateur fishers. More often it was found in the catches of 2003, 2004, 2009, and 2010. Near the Crimean shores it was recorded for the first time officially in 1999 at the mouth of Balaclava Bay and in the following years the abundance of this species gradually increased, distributing along the southern and western shores of the peninsula (Boltachev and Yurakhno 2002; Boltachev *et al.* 2009). Usually they were seen as singular specimens, pairs, or more rarely in small groups. In warm period of 2013 gilthead seabream was recorded quite often. It was informed that underwater hunters in the area from Cape Khersones to Cape Ay-ya caught more than 10 individuals with the standard length of 410-460 mm and weight of 1.4-2.1 kg (Boltachev and Karpova 2014a). It lives mostly near rocks, boulders and big stones, covered by *Cystoseira barbata*, but can be seen as well over sandy bottom. Primary way of penetration to the Black Sea is the migration from the Mediterranean Sea, but an increase in its abundance in the last years, especially near the Georgian shores, can be related to the marine farms growing gilthead seabream in Turkey, in particular near Trabzon.

Bogue *Boops boops* (Linneus, 1758) is seen quite rarely along all the shores of the Black Sea, including Georgia and Crimea (Svetovidov 1964; Bilecenoglu *et al.* 2002; our data). Near the Crimean shores it is seen practically every year. The last finding was recorded near Sevastopol, Cape Khersones, on January 24, 2015. It can be seen over solid (rocks, accumulations of stones) and soft (sand) bottom.

Besides the species of Sparidae family mentioned above, in June 2014 in the coastal zone of the south-western Crimea (Cape Fiolent region) an underwater hunter caught a big specimen of common dentex *Dentex dentex* (Linneus, 1758)

(Boltachev and Karpova 2014b). Total length of this specimen was 646 mm, standard length 557 mm, weight 5,260 g. It was the first finding of common dentex near the Crimean shores. Earlier singular specimens were seen in the coastal zone of Turkey, Bulgaria and Romania (Bilecenoglu *et al.* 2002; Vasil'eva 2007).

## Conclusions

In the last two decades in the coastal zones of Georgia and Crimea an increase in species diversity of Sparidae family representatives (6-7 species) was observed. It was also observed that such new species for this regions, like gilthead seabream and salema, increased in the occurrence and abundance. First of all, it is connected with the ongoing process of the mediterraneanization of the Black Sea ichthyofauna. Mariculture farms specialized on culturing gilthead seabream can play considerable role in the establishment of new species. It is important to monitor changes in the ichthyological fauna of all the Black Sea countries.

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